KNPR 1840.19 IAQ Section:

3.8 Indoor Air Quality (IAQ)

This Section establishes the IAQ management program at KSC. The support services described in this section are available to all Civil Service organizations and NASA contractor organizations as defined in their respective contracts.

Workers are often concerned they have symptoms or health conditions from exposures to contaminants in the buildings where they work. While some indoor air contaminants can aggravate pre-existing employee medical conditions such as allergies, or be a cause of building-related illnesses such as Legionnaires disease, poor IAQ also adversely affects employee efficiency and productivity. Research shows that building-related symptoms are associated with building characteristics, including dampness, cleanliness, and ventilation characteristics.

a. Signs and Symptoms of Poor IAQ

Signs and symptoms associated with poor IAQ depend on the air contaminant(s) in question and are often mistaken for symptoms of unrelated health conditions caused by common colds or the flu. In many cases, people report that their symptoms occur several hours after they come to work and resolve after they go home, or when they have been away on vacation. Common symptoms include:

(1) Dryness and irritation of the eyes, nose, throat, and skin.

(2) Headache.

(3) Fatigue.

(4) Shortness of breath.

(5) Hypersensitivity and allergies.

(6) Sinus congestion.

(7) Coughing and sneezing.

b. Causes of Poor IAQ

Poor IAQ is most often related to inadequate ventilation, chemical or biological contaminants from indoor sources, or chemical or biological contaminants from outdoor sources. Causes of symptoms are not always related to poor IAQ. For example, poor lighting, work at computers, or poor workstation ergonomics are often a cause of headaches and eye irritation. Cold and flu symptoms also are the same as those caused by poor IAQ.

(1) Inadequate ventilation

While not a contaminant, the buildup of exhaled carbon dioxide along with lack of sensible air motion is often related to IAQ complaints of ‘stuffy’ air.

(2) Chemical or biological contaminants from indoor sources

Most indoor air pollution comes from sources inside the building. For example, adhesives, carpeting, upholstery, manufactured wood products, copy machines, pesticides, and cleaning agents may emit volatile organic compounds. While airborne concentrations of these compounds may be well below OSHA or ACGIH exposure levels, they may be at sufficient concentrations to be detectable by odor or irritant effects. Biological contaminants such as mold and bacteria may form where there is a source of moisture that has accumulated in ducts, humidifiers and drain pans, or where water has collected on ceiling tiles, carpeting, or insulation.

(3) Chemical or biological contaminants from outdoor sources.

Pollutants from motor vehicle exhausts and odors from plumbing vents and building exhausts (e.g., bathrooms and kitchens) can enter the building through poorly located air intake vents, windows, and other openings. Biological contaminants include pollen, environmental molds, and smoke from fires.

c. Facility Design and New Construction:

Facility design shall endeavor to maintain a comfortable working environment through procurement and design of building Heating, Ventilation and Air Conditioning (HVAC) systems that meet American Society for Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) guidelines. Designers should consider operations and processes that generate air contaminants as a part of their normal operation and provide appropriate ventilation controls. Applicable facility plans will be reviewed by the MESC IH Office to assess the adequacy of controls planned for management of air contaminant sources.

d. Renovation of Occupied Facilities:

Construction or demolition activities in occupied buildings shall be planned and managed to minimize the generation of air contaminants. Plans for major modifications in occupied facilities may require construction of critical barriers to prevent migration of construction dust or chemical odors to occupied areas. Renovation plans will be reviewed by the MESC IH Office to assess the adequacy of controls planned for management of air contaminant sources.

e. Work area Inspection and Preventive Maintenance

(1) Work area supervisors or Facility Managers are responsible for inspection of their work areas and assigned facilities and submittal of work orders for correction of issues that may contribute to poor IAQ. Work areas should be inspected for:

(a) Visible water intrusion and water leaks.

(b) Visible water condensation on cold surfaces.

(c) Poor housekeeping and dust accumulation.

(d) Buildup of dust and debris on air diffusers.

(e) Use of cleaners, paints, adhesives or other products with volatile components.

(2) Facility Heating, Ventilation, and Air Conditioning (HVAC) and maintenance organizations are responsible for inspections to ensure proper function of HVAC system and facility structures and maintenance and repair of damaged or malfunctioning components required for maintenance of good IAQ. HVAC systems and structures should be inspected for:

(a) Damaged caulking, weather seals and other possible water leaks in exterior shells, windows, and doors.

(b) Cleanliness and proper drainage of mechanical room drain pans.

(c) Damaged or overloaded filters.

(d) Cleanliness and flow obstructions of fans and coils for proper setting and function of outdoor air intakes and dampers and damage to exclusion screens.

(e) Proper function and settings on thermostats and other HVAC controls.

(3) Mold remediation shall be in accordance with KSC Facilities Management Guidance for Mold Remediation, KSC-UG-1903.

(4) Pest Control shall ensure that only water based, low volatility pesticides are used inside occupied facilities.

(5) Facility Managers are responsible for:

(a) Ensuring all vehicles parked near HVAC air intakes, facility entrances, cul-de-sacs, or loading docks will be turned off to prevent exhaust fumes from entering facilities.

(b) Ensuring smoking at a facility is in compliance with KSC Smoke-Free Workplace Policy, KNPD 1216.1.

(c) Coordinating with MESC IH and the Grounds, Landscaping Maintenance and Pest Control Contract to evaluate pest infestations and cleanup, where required.

(d) Tracking closure of IAQ work orders related to their facility.

(e) Employees are responsible for ensuring they do not contribute to poor IAQ in their work area. Employees should keep their workstations clean and free of dust, not store perishable foods, and dispose of food waste in receptacles that are emptied daily. Employees should also be mindful of others and be aware that pet hair on clothing and certain perfumes or fragrances may contribute to coworkers IAQ symptoms.

f. Reporting IAQ signs and symptoms

(1) Employees shall report signs and symptoms they believe may be related to IAQ to their supervisors.

(2) Employees who report serious health problems are required to report to the OHF for medical assessment. Where, in the examining physicians opinion, the problem may be affected by workplace IAQ, the physician will schedule a work area IAQ assessment with the MESC IH Office.

(3) Where personnel complain of less serious symptoms, work area supervisors should contact the organization Health and Safety Office or MESC IH Office, as required by their employer, for evaluation of the work area.

g. IAQ Hazard Assessment

(1) The MESC IH Office will perform evaluation of the location(s) to identify possible causes of poor IAQ and recommend remediation or corrective actions.

(2) Evaluations may be initiated following an employee reporting to the OHF, at the request of organization Health and Safety Offices, or at the request of the area supervisor or Facility Manager, as required by their employer.

(3) When performing IAQ evaluations, IH personnel shall:

(a) Interview employees and area supervision to determine specific concerns of personnel.

(b) Perform visual inspection and sampling as required to identify possible sources of poor IAQ.

(c) Inspect carpeting and furnishings to determine condition and cleanliness.

(d) Complete a Facility IAQ Assessment Score Sheet.

(e) Review findings with the appropriate facility Operations and Maintenance and Safety and Health Offices to develop a recommended corrective action plan.
(f) Provide a written IAQ Assessment to report findings and recommended corrective actions. Report distribution shall be as directed by the responsible Safety and Health Office.

(f) Provide follow-up IAQ surveys when required to demonstrate effectiveness of corrective actions and work orders.

h. IAQ Work Orders

(1) Corrective actions requiring repair or maintenance services provided by the KSC ISC shall be initiated by submittal of work orders.

(2) Work orders shall include a Safety Risk Assessment Code where required by the organization safety and health office.

(3) A separate work order shall be submitted for each task required to close an IAQ corrective action.

(4) 4) Once all repairs/recommended corrective actions have been completed, facilities that previously achieved scores at or above 30 points shall have a follow-up air quality evaluation performed by the Industrial Hygiene Office to validate that actions were sufficient to improve air quality in the facility. Typically, follow-up evaluations are performed within 6 months of the previous evaluation that identified air quality issues.

i. IAQ Working Group (IAQWG)

The IAQWG serves as a government and contractor forum for the implementation of the IAQ program at the KSC. Membership consists of facility stakeholders and designated representatives of NASA and resident KSC contractor organizations representing: Occupational Medicine, Environmental Health, HVAC Maintenance, HVAC Design Engineering, Facilities Design Engineering, Fire Services, Contractor Safety, and Facility Maintenance. The panel shall:

(1) Provide consultative services to KSC management and contractors on items related to facility IAQ.

(2) Coordinate actions to resolve problems or rectify deficiencies identified in facilities that may result in reduction of air quality.

(3) Maintain an index of Facility IAQ Assessment Scores and facility locations ranked according to IAQ severity, to track closure of work orders required to correct IAQ problems.

(4) Review status of corrective actions and work orders and, as appropriate, update Facility IAQ Assessment scores on their closure.

(5) Provide a forum for discussion and resolution of issues related to stakeholders for indoor air quality at KSC and CCAFS.

(6) Assist the KSC IH Officer in the development and maintenance of indoor air quality policies and requirements.

(7) Keep members abreast of current developments in the management of IAQ.